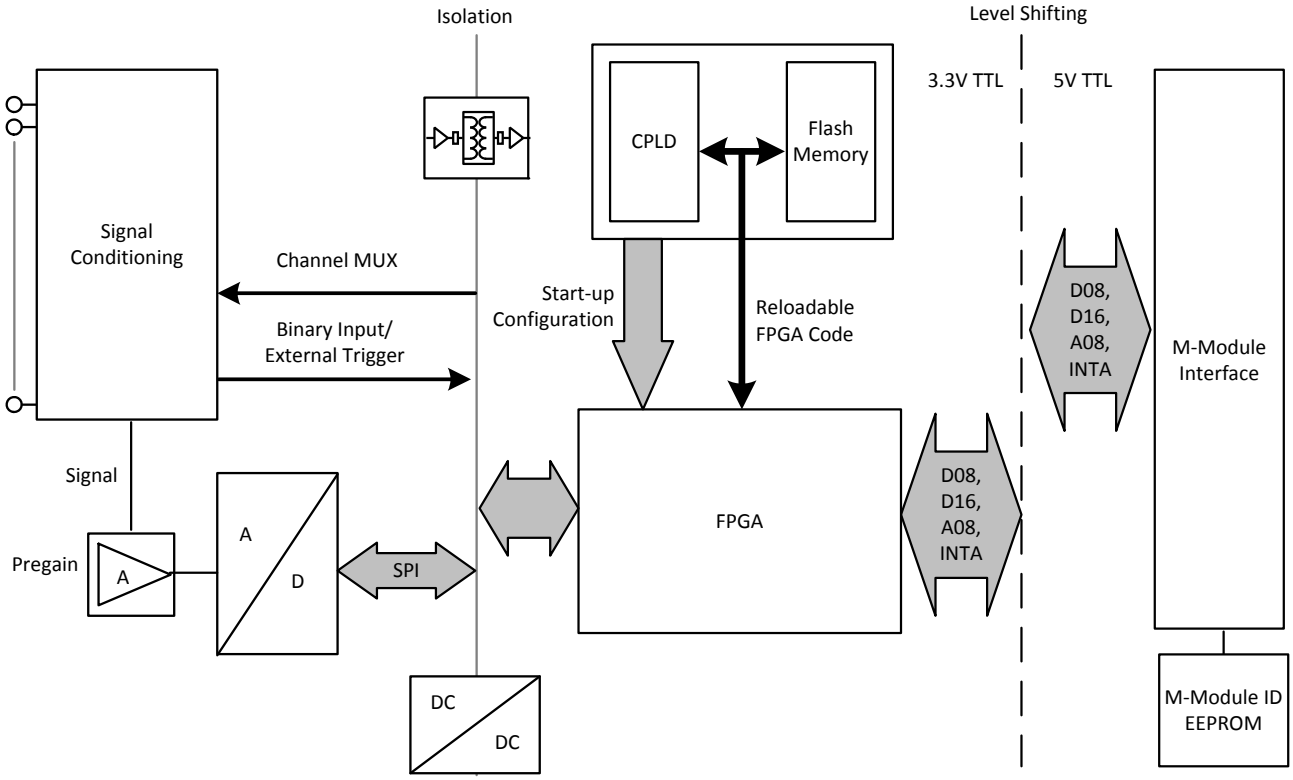
M36N – 8/16 Analog Inputs, 16 Bits

- **8/16 current or voltage inputs**
- **16 bits resolution**
- **< 8.5 µs channel acquisition time**
- **Precision +/- 0.05% typ.**
- **Unipolar/bipolar software-selectable**
- **Sample and hold**
- **Autoincrement of channel number**
- **External triggering**
- **Electrical isolation (500 V)**
- **-40 to +85°C with qualified components**

The mezzanine card M36N is a 16-bit analog M-Module for a wide range of standard input requirements such as 16 channels single-ended voltage or current and 8 channels differential voltage or current. The isolated supply voltages are generated by an onboard DC/DC converter, which supports an extended temperature range of -40 to +85°C. A fast A/D converter and auto-incrementation of the multiplexer channel make the M-Module ideal for fast sampling. The complete acquisition time of an M36N is 130 µs for all 16 channels and the precision is typically 0.05% over the whole temperature range. The M36N features totally automatic adjustment of each channel and each input range.

The FPGA implemented on the M36N controls the signal conditioning and in addition offers space for application-specific function extensions of the board. What is more, a soft-core processor can be implemented into the FPGA for intelligent pre-data-processing or additional functions like noise-shaping. For doing this it is optionally possible to use up to 6 MB non-volatile memory as well as assemble up to 32 MB DDR2 DRAM. The M36N is designed for a large range of applications, for example in automated test environments or process control systems.
The M36N is based on the M-Module ANSI mezzanine standard. It can be used as an I/O extension in any type of bus system, i.e. CPCI, VME or on any type of stand-alone SBC. Appropriate M-Module carrier cards in 3U, 6U and other formats are available from MEN or other manufacturers.

Diagram


Isolation
Level Shifting
3.3V TTL
5V TTL
CPLD
Flash Memory
Signal Conditioning
Channel MUX
Binary Input/ External Trigger
Start-up Configuration
Reloadable FPGA Code
D08, D16, A08, INTA
M-Module Interface
Signal
Pregain
A
A
D
SPI
FPGA
D08, D16, A08, INTA
DC
DC
M-Module ID EEPROM

Technical Data

A/D Conversion	■ 16 bits ■ Total acquisition time: 130µs for all 16 channels ■ Precision: ±0.05% typ. (over the whole temperature range) ■ Noise: ±3 LSB of mean value, delta = 0.8 (for gain factor 1) ■ Electrically isolated (500V isolation) ■ Programmable gain factor of 1, 2, 4, 8 or 16 ■ Offset max. 4 LSB (25°C) ■ Full-scale error max. 4 LSB (25°C) ■ Software-selectable unipolar or bipolar operation ■ Sample and hold possible with external trigger ■ Autoincrement of channel number
Single-Ended Input Signal Conditioning	■ Voltage or Current Inputs □ 16 analog inputs, single-ended □ High input voltage tolerance □ Cross-talk less than 56db □ Low-pass filter 1kHz ■ Voltage Measurement □ Precision: ±0.05% for gain factors 1 and 2, ±0.5% for gain factors 4 and 8, ±0.75% for gain factor 16 □ Voltage max. to IGND: ±15V (a higher voltage could destroy the board) □ Voltage full scale bipolar operation: ±10V □ Voltage full scale unipolar operation: 0..10V □ Input resistance: 100 kOhm, ±10% ■ Current Measurement □ Precision: ±1% □ Current max.: ±25mA □ Current full scale: ±20mA, UA = ±1.25V □ Load resistance: 62.5 Ohm, ±0.1%
Differential Input Signal Conditioning	■ Voltage or Current Inputs □ 8 analog inputs, differential □ High common mode range ±200V □ Cross-talk less than 60db □ Low-pass filter 3kHz ■ Voltage Measurement □ Precision: ±0.05% for gain factors 1 and 2, ±0.5% for gain factors 4 and 8, ±0.75% for gain factor 16 □ Voltage max.: ±200V (common mode) □ Voltage full scale bipolar operation: ±10V □ Voltage full scale unipolar operation: 0..10V □ Input resistance: 400 kOhm typ. ■ Current Measurement □ Precision: ±1% □ Current max.: ±25mA □ Voltage max. to IGND: ±200V □ Input resistance: 62.5 Ohm, ±0.1%
FPGA	■ FPGA Altera® Cyclone® II EP2C20 □ 18,752 logic elements □ 239,616 total RAM bits ■ Standard factory FPGA configuration: □ ADC control logic □ 16Z083_MM2WB - M-Module to Wishbone interface □ 16Z045_FLASH - Flash controller
Miscellaneous	■ External trigger (isolated, rising-edge sensitive) ■ External binary input
Peripheral Connections	■ Via front panel on a shielded 25-pin D-Sub receptacle connector ■ Via carrier board (rear I/O)

Technical Data

M-Module Characteristics	■ A08, D16, INTA, IDENT
Electrical Specifications	■ Isolation voltage: □ 500V DC between isolated side and digital side □ 500V DC between shield and isolated ground. Voltage between the connector shield and isolated ground is limited to 180V using a varistor as a protective device; AC coupling between connector shield and isolated ground through 47nF capacitor ■ Supply voltages/power consumption: □ +5V (4.85V..5.25V), 500 mA typ. (with single-ended input, 10V at all 16 inputs) ■ MTBF: 596,848h @ 40°C according to IEC/TR 62380 (RDF 2000)
Mechanical Specifications	■ Dimensions: conforming to M-Module Standard ■ Weight: 102g
Environmental Specifications	■ Temperature range (operation): □ -40..+85°C □ Airflow: min. 10m³/h ■ Temperature range (storage): -40..+85°C ■ Relative humidity range (operation): max. 95% non-condensing ■ Relative humidity range (storage): max. 95% non-condensing ■ Altitude: -300m to + 3,000m ■ Shock: 15g/11ms ■ Bump: 10g/16ms ■ Vibration (sinusoidal): 2g/10..150Hz ■ Conformal coating on request
Safety	■ PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers
EMC	■ Tested according to EN55011, EN50121-3-2 (limit value category A), EN61000-4-2 (ESD) and EN61000-4-4 (burst)
Software Support	■ MEN Driver Interface System (MDIS for Windows®, Linux, VxWorks®, QNX®, OS-9®) ■ For more information on supported operating system versions and drivers see Downloads.

Configuration & Options

Standard Configurations

Article No.	Channels	Type	Operation Temperature
04M036N00	16 single-ended	voltage	-40..+85°C
04M036N01	8 differential	voltage	-40..+85°C
04M036N02	16 single-ended	current	-40..+85°C
04M036N03	8 differential	current	-40..+85°C

Options

Input channels	■ Voltage or current ■ 8 differential or 16 single-ended
Additional user-defined functions	■ Nios® soft core implementation possible □ With up to 32MB SDRAM and up to 6MB non-volatile memory □ For intelligent data pre-processing or additional functions like noise shaping

Please note that some of these options may only be available for large volumes. Please ask our sales staff for more information.

Ordering Information

Standard M36N Models	**04M036N00**	16 analog voltage inputs, DC/DC converter, single-ended, -40..+85°C with qualified components
	04M036N01	8 analog voltage inputs, DC/DC converter, differential, -40..+85°C with qualified components
	04M036N02	16 analog current inputs, DC/DC converter, single-ended, -40..+85°C with qualified components
	04M036N03	8 analog current inputs, DC/DC converter, differential, -40..+85°C with qualified components
Miscellaneous Accessories	**05M000-00**	M-Module cable, 2m, with 25-pin D-Sub plug/housing to pig tail
	05M000-17	25 mounting screw sets to fix M-Modules on carrier boards
Software: Linux	This product is designed to work under Linux. See below for all available separate software packages.	
	13MD05-90	MDIS5 System (and Device Driver) Package (MEN) for Linux. This software package includes most standard device drivers available from MEN.
Software: Windows®	This product is designed to work under Windows®. See below for all available separate software packages.	
	13M036-70	MDIS4/2004 / MDIS5 Windows® driver (MEN) for M36 and M36N
Software: VxWorks®	This product is designed to work under VxWorks®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.	
	13M036-06	MDIS5 low-level driver sources (MEN) for M36 and M36N
Software: QNX®	This product is designed to work under QNX®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.	
	13M036-06	MDIS5 low-level driver sources (MEN) for M36 and M36N
Software: OS-9®	This product is designed to work under OS-9®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.	
	13M036-06	MDIS5 low-level driver sources (MEN) for M36 and M36N

For operating systems not mentioned here contact MEN sales.

Documentation	Compare Chart analog I/O M-Modules » Download	
	20M036N00	M36N User Manual
	20M036NER	M36N Errata

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